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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|---|---|---|---|
| 10/043,577 | 01/10/2002 | Daniel N. Harres | 38190/241063 | 7933 |

826 7590 03/21/2006

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| EXAMINER | |
|---|---|
| GHULAMALI, QUTBUDDIN | |
| **ART UNIT** | **PAPER NUMBER** |
| 2611 | |

DATE MAILED: 03/21/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

| Office Action Summary | Application No. 10/043,577 | Applicant(s) HARRES, DANIEL N. |
|---|---|---|
| | Examiner Qutub Ghulamali | Art Unit 2637 |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *02 February 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *2-11,13-22 and 24-30* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *2-6,9,13-17,20,24,25 and 28* is/are rejected.

7)☒ Claim(s) *7-8,10-11,18-19,21-22,26-27 and 29-30* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: _____.

## DETAILED ACTION

1. This Office Action is responsive to applicant's Remarks/Amendments filed on 02/02/2006.

### Response to Submission After Final

2. Applicant's amendment filed February 02, 2006 (see pages 2-10) with respect to the rejection of claims 1-30 have been fully considered. However, they do not place the claims in condition for allowance. The indication for allowability of claims 5, 16 and 25 previously indicated in the Final Office Action of November 7, 2005, is hereby withdrawn. Applicant's first submission after final filed on 02/02/2006 has been entered.

### *Claim Objections*

3. Claims 2-5, 9-11, 13-16, 18-22, 25-30 are objected to because of the following informalities:

4. Claims 2-5, 9-11, 13-16, 18-22, 25-30, recite "capable of", "is capable of", "that is capable of" at various places in the claims. It is held that the recitation that an element is "capable of" performing a function is not a positive limitation but only requires the ability to so perform. See re Schreiber, 44 USPQ 2d 1429 (Fed. Cir. 1997).

Claim 28, line 4, recite, "comprises" at two places. The first "comprises" can be deleted. Appropriate correction is required.

### *Claim Rejections - 35 USC § 103*

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 3, 5, 6, 9, 25 and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lin et al (USP 6,493,409) in view of Ojard (USP 6,327,311).

Regarding claims 5 and 25 Lin discloses a decoder (abstract; figs. 23, 24; col. 7, lines 17-23) for decoding at least one quadrature amplitude modulated (QAM) signal comprising: at least one tapped-delay line filter comprising at least one delay element, wherein said at least one tapped-delay line filter is capable of receiving the integrated at least one QAM signal and thereafter outputting a representation of each bit of the at least one n-bit digital signal (col. 19, lines 1-15; col. 20, lines 43-54). Lin although does not explicitly show an integrator for integrating at least one QAM signal, however, Lin does disclose the integrator as an integral plus proportional filter (abstract; col. 8, lines 6-21), and as one of ordinary skill in art will understand, integrating at least one QAM signal is equivalent to adapting Lin's decision directed techniques because it can provide estimating the angle and phase/frequency compensation more efficiently. Lin's silence regarding the at least one QAM signal is transmitted at a rate of t, is overcome by Ojard. Ojard in a similar field of endeavor discloses a transceiver wherein transmitter transmits at least one QAM signal at a rate t (col. 4, lines 56-67; col. 6, lines 41-51; col. 8, lines 46-58). It would have been obvious to a person of ordinary skill in the art at the time the invention was

made to use transmitter to transmit at least one QAM signal at a rate t as taught by Ojard in the decoder of Lin because the receiver can efficiently synchronize and reproduce the transmitted signal.

Regarding claim 3, Lin discloses a decoder comprises n integrators, and wherein said at least one tapped-delay line filter comprises n tapped-delay line filters (see col. 19, lines 1-15).

AS per claim 6, Lin discloses at least one carrier frequency comprises n/2 carrier frequencies wherein each carrier frequency is equal to a fraction of the transmission rate t/i where i=1, 2, 4, ...n (col. 11, lines 11-30).

Regarding claims 9 and 28, Lin discloses at least one QAM signal includes at least one quadrature (Q) phase portion that includes a phase orthogonal to at least one in phase (I) QAM signal (col. 12, lines 4-10, 25-44).

7. Claims 14, 16, 17 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ojard (USP 6,327,311) in view of Lin et al (USP 6,493,409).

Regarding claim 16, Ojard discloses a digital communication system comprising:
a transmitter for quadrature amplitude modulation (QAM) encoding each bit of at least one n-bit digital signal into at least one OAM signal wherein said transmitter is transmitting the at-least one QAM signal (col. 6, lines 16-29; col. 8, lines 34-58), wherein said transmitter is transmitting the at least one QAM signal at a rate of t (col. 4, lines 56-67; col. 6, lines 41-51; col. 8, lines 46-58), wherein the at least one QAM Signal includes at least one in-phase portion modulated by at least one carrier signal at a carrier frequency fc wherein at least one tapped-delay line filter for receiving the integrated in-phase portion of the at least one QAM signal and thereafter outputting a representation of at least one bit of the al least one n-bit digital signal (16-bit QAM signal, 4

bits of data per symbol). Ojard however does not explicitly disclose a receiver for receiving the at least one QAM signal, wherein said receiver is integrating the at least QAM signal, wherein said receiver includes at least one tapped delay line filter for receiving the integrated at least one QAM signal and thereafter outputting a representation of each bit of the at least one n-bit digital signal. Lin in a similar field of endeavor discloses a receiver for receiving the at least one QAM signal wherein said receiver is integrating the at least QAM signal (col. 19, lines 1-15; col. 20, lines 43-54). It would have been obvious to a person of ordinary skill in the art at the time the invention was made to use a receiver to receive, wherein at least one tapped delay filter for receiving the integrated QAM signal as taught by Lin in the system of Ojard because it can allow receiver to interpret the transmitted samples or signals in an efficiently manner with least channel distortion and intersymbol interference.

As per claim 17, Ojard discloses all limitation of the claim except does not explicitly disclose at least one carrier frequency comprises n/2 carrier frequencies wherein each carrier frequency is equal to a fraction of the transmission rate t/i where i=1, 2, 4, ...n. Lin in a similar field of endeavor discloses at least one carrier frequency comprises n/2 carrier frequencies wherein each carrier frequency is equal to a fraction of the transmission rate t/i where i=1, 2, 4, ...n (col. 11, lines 11-30). It would have been obvious to a person of ordinary skill in the art at the time the invention was made to use carrier frequency representative of fractional carrier frequencies as taught by Lin in the system of Ojard because it can accordingly provide a filtered symmetric signal output which is true sinusoid.

Regarding claim 14, Ojard discloses all limitation of the claim except does not explicitly disclose a decoder comprises n integrators for integrating the at least one QAM signal and

receiver includes n tapped delay line filters. Lin in a similar field of endeavor discloses a decoder comprises n integrators for integrating the at least one QAM signal and receiver includes n tapped delay line filters (see col. 19, lines 1-15). It would have been obvious to a person of ordinary skill in the art at the time the invention was made to use a plurality of integrators for integrating and n tapped delay line filters as taught by Lin in the system of Ojard because it can reduce the hardware complexity associated with multiple processing of signals.

As per claim 20, Ojard discloses all limitation of the claim except does not explicitly disclose at least one QAM signal includes at least one quadrature (Q) phase portion that includes a phase orthogonal to at least one in phase (I) QAM signal. Lin in a similar field of endeavor discloses at least one QAM signal includes at least one quadrature (Q) phase portion that includes a phase orthogonal to at least one in phase (I) QAM signal (col. 12, lines 4-10, 25-44). It would have been obvious to a person of ordinary skill in the art at the time the invention was made to use at least one quadrature (Q) phase portion that includes a phase orthogonal to at least one in phase (I) QAM signal as taught by Lin in the system of Ojard because it can provide the I and Q reference signals leading to adequate control in timing error.

8. Claims 2, 4 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lin et al (USP 6,493,409) in view of Ojard (USP 6,327,311) and further in view of Visser (USP 4,700,360).

Regarding claims 2 and 24, Lin and Ojard in combination disclose all limitations of the claim. The combination, however, is silent regarding a comparator capable of receiving digital signal and outputting the represented signal. Visser in a similar field of endeavor discloses a comparator capable of receiving the representation of each bit of the at least one n-bit digital

signal and thereafter outputting each bit of the at least one n-bit digital signal based upon a comparison of the representation of each bit to a predetermined threshold (col. 5, lines 55-67). It would have been obvious to a person of ordinary skill in the art at the time the invention was made to use a comparator as taught by Visser in the combined system of Lin and Ojard because it can provide adequate representation in the reconstruction of the encoded signals.

Regarding claim 4, Lin and Ojard in combination disclose all limitations of the claim. The combination of Lin and Ojard, however, is silent regarding n comparators capable of receiving the representation of digital signal and outputting the represented signal. Visser in a similar field of endeavor discloses n comparators (see fig. 7, elements 62, 66) for receiving the representation of each bit of the at least one n-bit digital signal and thereafter outputting each bit of the at least one n-bit digital signal based upon a comparison of the representation of each bit to a predetermined threshold (col. 5, lines 55-67). It would have been obvious to a person of ordinary skill in the art at the time the invention was made to use n comparators as taught by Visser in the combined system of Lin and Ojard because it can represent in the reconstruction of the encoded signal.

9. Claims 13 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ojard (USP 6,327,311) in view of Lin et al (USP 6,493,409) and further in view of Visser (USP 4,700,360).

Regarding claim 13, the combined art of Ojard and Lin disclose all limitations of the claim. The combination, however, is silent regarding receiver outputting each bit of the at least one n bit digital signal based on comparison of the representation of each bit to a predetermined

threshold. Visser in a similar field of endeavor discloses a comparator for receiving the representation of each bit of the at least one n-bit digital signal and thereafter outputting each bit of the at least one n-bit digital signal based upon a comparison of the representation of each bit to a predetermined threshold (col. 5, lines 55-67). It would have been obvious to a person of ordinary skill in the art at the time the invention was made to use a comparator as taught by Visser in the combined system of Ojard and Lin because the results from the comparator can provide adequate representation in the reconstruction of the encoded signals.

Regarding claim 15, the combination of Ojard and Lin disclose all limitations of the claim. The combination, however, is silent regarding n comparators for receiving the representation of digital signal and outputting the represented signal. Visser in a similar field of endeavor discloses n comparators (see fig. 7, elements 62, 66) capable of receiving the representation of each bit of the at least one n-bit digital signal and thereafter outputting each bit of the at least one n-bit digital signal based upon a comparison of the representation of each bit to a predetermined threshold (col. 5, lines 55-67). It would have been obvious to one of ordinary skill in the art at the time the invention was made to use n comparators as taught by Visser in the combined system of Ojard and Lin because the results from the comparator can provide adequate representation in the reconstruction of the encoded signals.

### *Allowable Subject Matter*

10. Claims 7-8, 10-11, 18-19, 21-22, 26-27, 29-30 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims and claim objections cited herein above.

## *Conclusion*

11. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

US Patents:

Dabak et al (USP 6,594,473) discloses a wireless system with transmitter transmitting a plurality of symbols with encoders.

Gardner et al (USP 6,580,751) shows a high speed downhole communication system in an OFDM environment.

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Qutub Ghulamali whose telephone number is (571) 272-3014. The examiner can normally be reached on Monday-Friday, 7:00AM - 4:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jay Patel can be reached on (571) 272-2988. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

QG.
March 8, 2006.

JEAN B. CORRIELUS
PRIMARY EXAMINER
3-16-06